

## THAT WHICH IS CLAIMED:

1. A method of monitoring an air atmosphere for a harmful biological or chemical agent, the method comprising:
  - 5 providing a plurality of mammalian respiratory airway epithelial cells borne on a porous support;  
contacting the porous support with a cell nutrient medium and with air by positioning said porous support at an air-liquid interface between the cell nutrient liquid and the air;
  - 10 sampling the air atmosphere to thereby create an air flow over the air-liquid interface so that the respiratory epithelial cells borne on the porous silicone support are contacted by the sampled air; and  
monitoring the respiratory epithelial cells for at least one physiological parameter indicating the cells have been exposed to the
  - 15 harmful agent.
2. The method of claim 1, wherein the plurality of mammalian respiratory airway epithelial cells consists of primary rabbit cells.
- 20 3. The method of claim 1, further comprising sufficient the cell nutrient medium in contact with the porous support to nourish the plurality of respiratory airway epithelial cells.
4. The method of claim 1, wherein the porous support comprises silicone.
- 25 5. The method of claim 1, wherein the porous support comprises a nanoporous silicone composition.

6. The method of claim 1, wherein the porous support consists of a nanoporous silicone composition having pores no larger than one micrometer in diameter.
- 5 7. The method of claim 1, wherein the porous support comprises a silicone composition wherein the pores consist of a sufficiently small diameter to prevent the plurality of mammalian respiratory airway epithelial cells from falling thereinto.
- 10 8. The method of claim 1, wherein the porous support comprises a nanoporous silicone composition having an average pore size smaller than the average size of the plurality of mammalian respiratory airway epithelial cells.
- 15 9. The method of claim 1, wherein the plurality of mammalian respiratory airway epithelial cells comprises a confluent layer of cells.
10. The method of claim 1, wherein the plurality of mammalian respiratory airway epithelial cells comprises a monolayer of cells.
- 20 11. The method of claim 1, wherein the plurality of mammalian respiratory airway epithelial cells comprises ciliated cells and goblet cells.
12. The method of claim 1, wherein the plurality of mammalian respiratory airway epithelial cells comprises ciliated cells and goblet cells and the at least one physiological parameter monitored comprises ciliary beating frequency of the ciliated cells.
- 25 13. The method of claim 1, wherein the plurality of mammalian respiratory airway epithelial cells comprises ciliated cells and goblet cells and the at least
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one physiological parameter monitored comprises an electrical response of the plurality of mammalian respiratory airway epithelial cells

14. The method of claim 1, wherein the plurality of mammalian respiratory  
5 airway epithelial cells comprises ciliated cells and goblet cells and the at least one physiological parameter monitored comprises mucin secretion from the goblet cells.

15. The method of claim 1, wherein the harmful biological or chemical  
10 agent comprises a toxin.

16. The method of claim 1, wherein the harmful biological or chemical agent comprises a biological warfare agent.

15 17. The method of claim 1, wherein the harmful biological or chemical agent comprises a chemical warfare agent.

18. A method of monitoring an air atmosphere for a harmful biological or chemical agent, the method comprising:

20 providing a porous support having an upper surface and a lower surface, and having a plurality of channels etched on the upper surface of the porous support;

contacting the porous support with a cell nutrient medium and with air by positioning said porous support at an interface between the  
25 cell nutrient medium and the air so that the lower surface of the support is in contact with the cell nutrient medium and so that the upper surface of the support is in contact with the air;

seeding a plurality of mammalian respiratory airway epithelial cells into the plurality of channels etched on the upper surface of the  
30 porous support;

sampling the air atmosphere to thereby create an air flow over the upper surface of the porous support so that the plurality of mammalian respiratory airway epithelial cells seeded into the etched channels are contacted by the sampled air; and

5 monitoring the plurality of mammalian respiratory airway epithelial cells for at least one physiological change indicating the cells have been exposed to the harmful agent.

19. The method of claim 18, wherein the plurality of mammalian respiratory  
10 airway epithelial cells are primary rabbit cells.

20. The method of claim 18, further comprising sufficient cell nutrient medium in contact with a lower surface of the porous support to nourish the airway epithelial cells.

15 21. The method of claim 18, wherein the porous support comprises silicone.

22. The method of claim 18, wherein the porous support comprises a  
20 nanoporous silicone composition.

23. The method of claim 18, wherein the porous support consists of a nanoporous silicone composition having pores no larger than one micrometer in diameter.

25 24. The method of claim 18, wherein the porous support comprises a silicone composition wherein the pores consist of a sufficiently small diameter to prevent the plurality of mammalian respiratory airway epithelial cells from falling thereinto.

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25. The method of claim 18, wherein the porous support comprises a nanoporous silicone composition having an average pore size smaller than the average size of individual cells in the plurality of mammalian respiratory airway epithelial cells.

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26. The method of claim 18, wherein the plurality of mammalian respiratory airway epithelial cells comprises a confluent layer of cells.

27. The method of claim 18, wherein the plurality of mammalian respiratory  
10 airway epithelial cells comprises a monolayer of cells.

28. The method of claim 18, wherein the plurality of mammalian respiratory airway epithelial cells comprises ciliated cells and goblet cells.

15 29. The method of claim 18, wherein the plurality of mammalian respiratory airway epithelial cells comprises ciliated cells and goblet cells and the at least one physiological parameter monitored comprises ciliary beating frequency of the ciliated cells.

20 30. The method of claim 18, wherein the plurality of mammalian respiratory airway epithelial cells comprises ciliated cells and goblet cells and the at least one physiological parameter monitored comprises an electrical response of the plurality of mammalian respiratory airway epithelial cells.

25 31. The method of claim 18, wherein the plurality of mammalian respiratory airway epithelial cells comprises ciliated cells and goblet cells and the at least one physiological parameter monitored comprises mucin secretion from the goblet cells.

32. The method of claim 18, wherein the harmful biological or chemical agent comprises a toxin.

33. The method of claim 18, wherein the harmful biological or chemical  
5 agent comprises a biological warfare agent.

34. The method of claim 18, wherein the harmful biological or chemical agent comprises a chemical warfare agent.